# AP322A-EC Datasheet

Aiming to create better and safer working environments and life experiences through the products we deliver.


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## *Easy Programmable Edge Computer for IIoT*

# AP322A-EC

### Industrial Secure Wireless Edge Computer

AVCOMM AP322A-EC edge computing platform is designed for embedded data acquisition applications. The computer comes with two software selectable RS-232/422/485 full-signal serial ports and two 10/100/1000 Mbps Ethernet ports. These versatile communication capabilities let users efficiently customize for a variety of complex communication applications. The QCA9558 MIPS-based processor that is widely applicable to a variety of industrial solutions. The built in Node-RED flow-based programming in the tiny embedded computer provides reliable and secure gateway for data acquisition and processing at field sites as well as a user-friendly communication platform for many other large-scale deployments.


### Programmable Edge Computer and Gateway

- QCA9558 MIPS-based processor 720MHz processor
- 2 auto-sensing 10/100/1000 Mbps Ethernet ports
- SD socket for storage expansion
- Rich programmable LEDs and a programmable button for easy installation and maintenance
- Node-RED flow-based programming

### Serial Communication & High Throughput Data Switching

- Dual serial ports with RS232/422/485 full functions for serial over LTE/Wi-Fi/Ethernet data switching
- 2-port Gigabit Ethernet supports routing and bridging mode
- Hardware NAT for CPU utilization saving*

### Internet Security Suite and Cryptographic

- Netfilter suite for firewall
- Iptables suite for NAT/NAPT and port forwarding
- OpenVPN, IPsec for secure remote connection
- HTTPs/SSH for secure login
- AES, SHA, OpenSSL, random generator

### Cloud Management Service

- Support Amazon AWS & Microsoft Azure cloud service*
- Support proprietary ATMS cloud service*
- Interactive monitoring dashboard and map shows the status, signal strength, location etc.*

### High speed 4G LTE & Wi-Fi Network

- LTE Cat.4, 2x2 MIMO, 150M downlink and 50M uplink
- LTE Cat.6 with 2CA, 2T2R MIMO provides 300M downlink and 50M uplink
- 4G/3G/2G full cellular network compatibility
- Support GPS for location services
- IEEE 802.11ac compliant & backward compatible with 802.11a/b/g/n
- Selectable 5G/2.4G Wi-Fi for local coverage, up to 866Mbps bandwidth

### Programming Environment

- GCC C/C++ cross development tool chain
- Ash, bash* System Shell vim, nano* text editor
- Lua, Perl*, Python* programming language
- Optional software kit for IEC 60870–5–101, IEC 60870–5–104

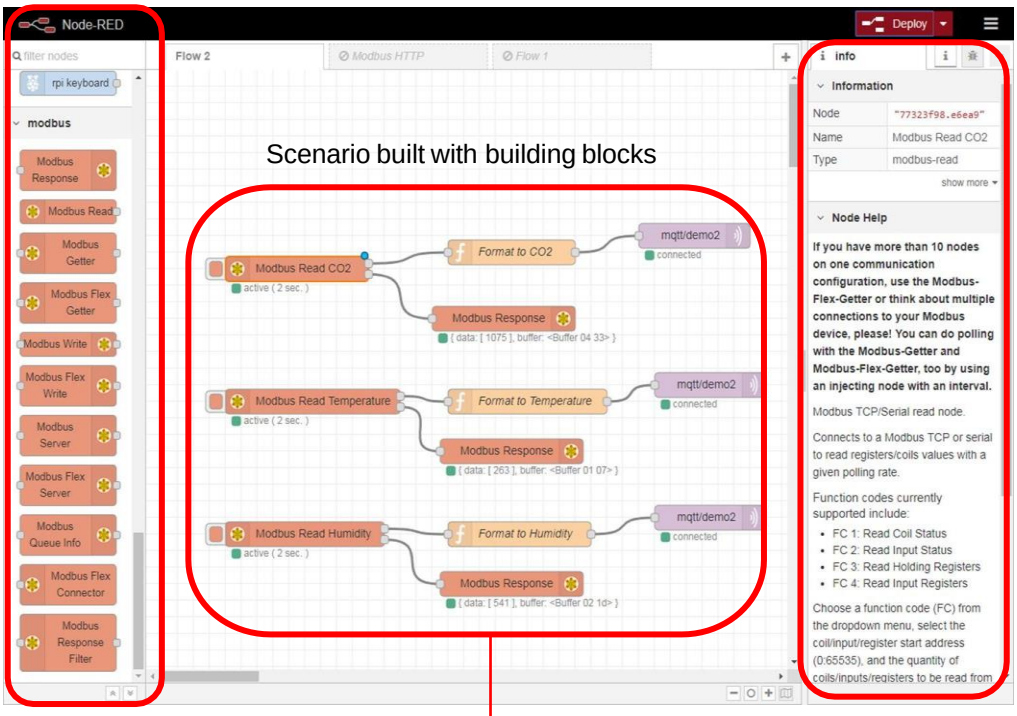
### Rugged Design for Wayside Surveillance, ITS Application

- EN50121-4 railway trackside EMC certificate design for Industrial IoT, ITS applications
- Effective heat dissipation design for operating in -40~75°C environments
- CE Marking
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC compliance

## Ordering Information

| Model Name | Description |
|---|---|
| **AP322A-EC** | Industrial Edge Computing Secure Serial Server, 2GbE+2COM, USB, SD |
| **AP322A-EC-WLAN** | Industrial Secure Wireless Edge Computer, 2GbE+2COM, USB, SD, 802.11ac/n WLAN (with WiFi antennas) |
| **AP322A-EC-LTE** | Industrial Secure Cellular Edge Computer, 2GbE+2COM, USB, SD, LTE-E, 2SIM, (with LTE antennas) |
| **AP322A-EC-WLAN-LTE** | Industrial Secure Cellular Edge Computer, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, (with LTE and WiFi antennas) |

## ✓ Intuitive Node-RED Programming

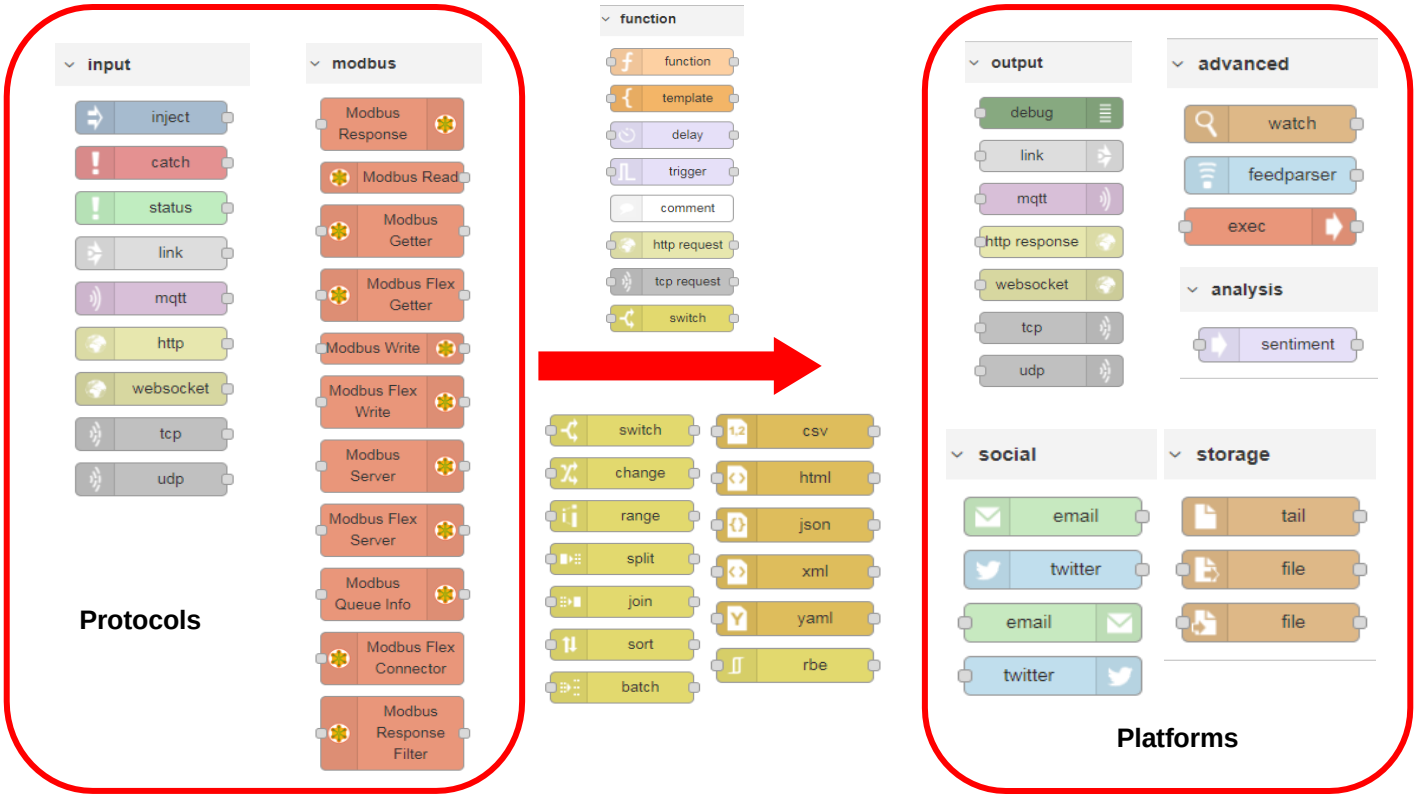



Library With Building Blocks

CO2, Humidity, Temperature

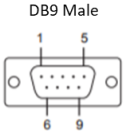
Information Panel

## ✓ Link Different Protocols and Platforms



| Interface | |
|---|---|
| **CPU** | QCA9558 MIPS-based processor 720MHz processor |
| **OS (preinstalled)** | Linux (OpenWRT LEDE, Kernel 4.4) |
| **USB** | USB 2.0 hosts x 1, Type A connector |
| **DRAM** | DDR2 SDRAM 256MB |
| **Main Storage** | 8G Micro SD |
| **Storage Expansion** | Micro SD expand to 16G/32G/64G |
| **Ethernet Port** | 2 x 10/100/1000MBase-T RJ45, Auto Negotiation, Auto-MDI/MDIX |
| **System LED** | 1 x PWR: Green On<br>2 x Ethernet Ports: Link: Green On, Activity: Green Blinking<br>Programmable: 1x SYS, 2 x Serial Ports (s1, s2), 1 x DO: Red On<br><br>**AP322A-EC-LTE:**<br>Programmable: Ra, Rb, Rc<br><br>**AP322A-EC-WLAN-LTE:**<br>Programmable: Ra, Rb, Rc, Rd, Re<br>Rf: Base station connected: Green On for 2 sec period, Base station disconnected: Green Off for 2 sec period |
| **Reset** | 1 x Reset button (Programmable) |
| **SMA Socket** | **AP322A-EC-LTE:** Up to 2 x RP-SMA Female<br>LTE 2T2R: ANT1 for LTE Main, ANT2 for LTE Aux OR<br>LTE + GPS: ANT1 for LTE Main, ANT2 for GPS<br>**AP322A-EC-WLAN-LTE:** Up to 5 x RP-SMA Female<br>Wi-Fi 2T2R: ANT1 for Wi-Fi1, ANT2 for Wi-Fi2,<br>LTE 2T2R: ANT3 for LTE Main, ANT 5 for LTE Aux<br>GPS: ANT4 |
| **SIM Socket** | 2 x Nano SIM with redundancy |
| **Serial** | Up to 2 x RS232/422/485, DB9 |
| **Power Input, Digital Output** | 6-Pin Removable Terminal Block Connector<br>4 Pin for Redundant Power<br>2 Pin for DO (Relay Alarm)<br>DO: Dry Relay Output with 1A/24V DC |

DB9 Male




| Pin | RS232 | RS485-4w/422 | RS485-2w |
|---|---|---|---|
| 1 | DCD | TX- | Data- |
| 2 | TXD | RX+ | - |
| 3 | RXD | TX+ | Data+ |
| 4 | DSR | - | - |
| 5 | GND | GND | - |
| 6 | DTR | RX- | - |
| 7 | CTS | - | - |
| 8 | RTS | - | - |
| 9 | RI | - | - |

| Software | |
|---|---|
| **OS** | Linux OpenWRT LEDE |
| **Web Server** | uHttpd, luCI Web Interface, Apache* |
| **Terminal Server (SSH)** | Secure encrypted communications between two untrusted hosts over an insecure network |
| **Kernel** | GNU/Linux kernel v4.4 |
| **System Shell** | ASH (default), BASH* |
| **Text Editor** | vim, nano* |
| **File System** | JFFS2, NFS, Ext3, Ext4, VFAT, OverlayFS, NTFS |
| **Internet Protocol Suite** | TCP, UDP, IPv4, IPv6, SNMPv2, v3, ICMP, ARP, HTTP, CHAP,PAP,DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL, SCP |

| | |
|---|---|
| **Programming Language Support** | Lua, Perl*, Python* |
| **Flow-based programming** | Node-RED (Modbus TCP and Serial contribution package included) |
| **Internet Security Suite** | OpenVPN, IPSec, Netfilter/iptables |
| **Cryptographic** | AES, SHA, OpenSSL, random generator |
| **Linux Board Support Packages (BSP)** | GCC C/C++ cross development tool chain<br>Kernel/ filesystem |
| **Cellular Networking** | QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol |
| **Cellular Properties** | **(LTE Cat. 6)** |
| **Standard** | UMTS/HSPA 3GPP Release 8<br>LTE 3GPP Release 12 (LTE Cat.6) |
| **Data Rate** | TD-SCDMA: DL Max 4.2Mbps, UL: Max 2.2Mbps<br>HSPA: DL: Max. 42 Mbps, UL: Max. 5.76 Mbps<br>WCDMA: DL: Max 384Kbps, UL: Max 384Kbps<br>LTE-FDD: DL: Max. 300 Mbps, UL: Max. 50 Mbps, 2x2 DL MIMO<br>LTE-TDD: DL: Max. 226 Mbps, UL: Max. 28 Mbps, 2x2 DL MIMO |
| **Band Information: LTE-E** | LTE-FDD: B1/B3/B5/B7/B8/B20/B28<br>LTE-TDD: B38/B40/B41<br>WCDMA: B1/B3/B5/B8 |
| **Band Information: LTE-U** | LTE-FDD: B2/B4/B5/B7/B12/B13/B17/B25/B26/B30/B66<br>LTE-TDD: B41<br>WCDMA: B2/B4/B5 |
| **Cellular Properties** | **(LTE Cat. 4)** |
| **Standard** | GSM/GPRS/EDGE 3GPP Release 6<br>UMTS/HSPA 3GPP Release 8<br>LTE 3GPP Release 11 |
| **Data Rate** | GPRS: DL: max. 85.6 kbps, UL: max. 85.6 kbps<br>EDGE: DL: max. 236.8 kbps, UL: max. 236.8 kbps<br>HSPA: DL: max. 42 Mbps, UL: max. 5.76 Mbps<br>LTE-FDD Cat.4: DL: max. 150 Mbps, UL: max. 50 Mbps, 2x2 DL MIMO<br>LTE-TDD Cat.4: DL: max. 130 Mbps, UL: max. 35 Mbps, 2x2 DL MIMO |
| **Band Information: LTE-EUX** | LTE: FDD B1/B3/B7/B8/B20/B28A<br>LTE: TDD B38/B40/B41<br>WCDMA: FDD B1/B8, GSM: B3/B8 |
| **Band Information: LTE- ECGA** | LTE: FDD B1/B3/B7/B8/B20/B28A<br>WCDMA: FDD B1/B8, GSM: B3/B8 |
| **Band Information: LTE-AU** | LTE: FDD B1/B2*/B3/B4/B5/B7/B8/B28<br>LTE: TDD B40<br>WCDMA: FDD B1/B2/B5/B8, GSM: B2/B3/B5/B8 |
| **Band Information: LTE-G (By MoQ Request)** | LTE: FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28<br>LTE: TDD B38/B39/B40/B41<br>WCDMA: FDD B1/B2/B4/B5/B6/B8/B19, GSM: B2/B3/B5/B8 |
| **GPS Properties** | |
| **GNSS** | GPS/GLONASS/BeiDou/Galileo |
| **Performance** | Cold start: 18s, Warm start: 2.2s, Hot start: 1.8s |
| **Sensitivity** | Cold start: -146dBm, Reacquisition: -157dBm, Tracking: -157dBm |
| **Accuracy** | <1.5M |
| **GNSS Frequency** | GPS/Galileo: 1575.42±1.023 MHz<br>GLONASS: 1597.5~1605.8 MHz<br>BeiDou: 1561.098±2.046 MHz |

| | |
|---|---|
| **Antenna** | Frequency range: 1561~1615MHz<br>Polarization: RHCP or linear<br>VSWR: <2 (Typ.)<br>Passive antenna gain: >0dBi |
| **Wi-Fi Properties** | |
| **Standard** | IEEE 802.11ac/a/b/g/n, 2T2R MIMO<br>802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) |
| **Data Rate** | 802.11ac: MCS0 ~ 9, max. 866Mbps<br>802.11b: 11Mbps / 802.11a/g: 54Mbps / 802.11n: MCS0 ~ 15, max. 300Mbps |
| **Frequency** | ISM Band, 2.412GHz ~ 2.472GHz, 5.180MHz ~ 5.825MHz(Band 1,4) |
| **RSSI** | ≦20db/≦23db, compliant with CE 2.4G/5G request |
| **Antenna** | |
| **LTE Default Antenna** | **Frequency:** 704~960/1710~2690 MHz |
| | **Gain:** 2 dBi |
| | **Dimension:** 161xΦ13 mm |
| **Wi-Fi Default Antenna** | **Frequency:** 2400~2500/ 4900~5900 MHz |
| | **Gain:** 2.4GHz: 2.5 dBi, 5GHz: 3dBi |
| | **Direction:** Omni-directional |
| | **Dimension:** 196xΦ13 mm |
| **Power Requirement** | |
| **Input Voltage** | 36V (36~72VDC) |
| **Reverse Polarity Protect** | Yes |
| **Mechanical** | |
| **Installation** | DIN Rail |
| **Enclosure Material** | Steel Metal with Aluminum |
| **Dimension** | 50 x 151 x 120 mm(W x H x D) / without DIN Rail Clip |
| **Ingress Protection** | IP30 |
| **Weight** | 600g~660g without package |
| **Environmental** | |
| **Operating Temperature & Humidity** | -40˚C~75˚C , 5%~95% Non- Condensing |
| **Storage Temperature** | -40˚C~85˚C |
| **MTBF** | >200,000 hours at 40º full cycle |
| **Warranty** | 5 years |

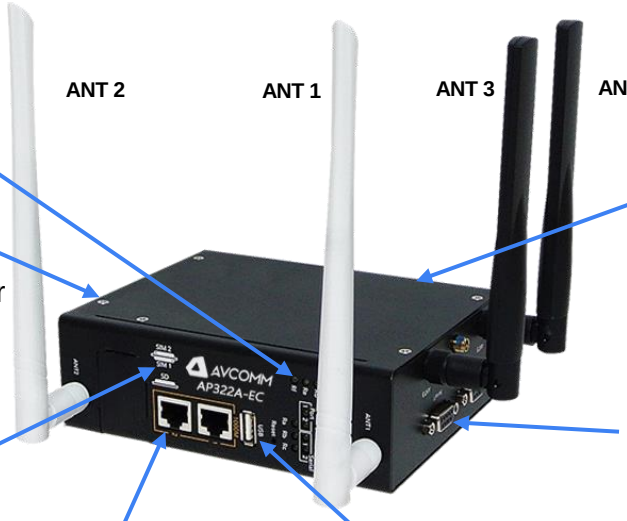
| Approval | |
|---|---|
| **Safety** | EN 62368-1:2014/AC:2017 |
| **EMC** | Railway Roadside EN 50121-1/4, EN61000-6-4<br>EN61000-4-2 ESD, EN61000-4-3 RS, EN61000-4-4 EFT, EN61000-4-5, EN61000-4-6 CS,<br>EN61000-4-8 Magnetic Field<br>EN61000-4-12/16/17/18/29 for power application |
| **CE** | CE RED Compliance<br>Safety: EN 62368-1<br>EN 62311 MPE assessment<br>EN 301 489-1/17/19/52, EN 55032/55024<br>EN 300 328/EN 301 893*, EN 301 908-1* |
| **FCC** | FCC part 15B Class A Compliance, FCC Approved LTE/WLAN Module |
| **Environmental** | Shock/Vibration: EN 50155:2017/EN 61373:2010 Railway Shock/Vibration<br>Shock: IEC60068-2-27 Compliance<br>Free fall: IEC60068-2-31 Compliance<br>Vibration: IEC 60068-2-6 Compliance |

## Function interface

| | AP322A-EC-LTE | AP322A-EC WLAN-LTE |
|---|---|---|
| Ant 1 | LTE-Main | Wi-Fi 1 |
| Ant 2 | LTE- Diversity/ GPS (by model) | Wi-Fi 2 |
| Ant 3 | - | LTE-Main |
| Ant 4 | - | GPS (by model) |
| Ant 5 | - | LTE-Diversity |

*Antenna: Wi-Fi in White; LTE in Black

**System LED**
- 1 x Power
- 1 x System Status
- 1 x DO
- 2 x Ethernet Port
- 2 x Serial Port
- 6 x Radio LED (Ra~Rf)




**Integrated Power Connector**
- 1 x 6-pin terminal block
  4 pin for redundant power
  2 pin DO

**DIN Clip**

**Serial Communication**
- RS232/422/485 Full functions
- DB9 female

**SIM Card**
- 1x SIM or 2 x SIM
- 1xSD

**Gigabit Ethernet**
- 2-port 10/100/1000M RJ45
- WAN + LAN configurable

**USB Extension Port**
- External Storage

## Installation dimensions

Unit: inch ±0.040 / [mm] ±1.00